DOCUMENT RESUME

ED 032 075 LI 001 325

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Telefacsimile Services Between Libraries With the Xerox Magnavox Telecopier.
Nevada Univ., Reno. Library.
Spons Agency-Council on Library Resources, Inc., Washington, D.C.
Report No-CLR-314
Pub Date 20 Dec 66
Note-57p.
EDRS Price MF-$0.25 HC-$2.95
Descriptors-Automation, *Facsimile Transmission, *Information Dissemination, *Library Cooperation, *Library Networks, *Telephone Communication Systems
Identifiers-*Xerox Magnavox Telecopier

A 30-day test of the Xerox Magnavox Telecopier was conducted in order to evaluate its feasibility as a means of transmitting printed pages between libraries, primarily as a faster alternative to the usual method of mailing a Xerox copy of a journal article from one library to another in response to a mailed request. The test was carried on between the Reno and Las Vegas campuses of the University of Nevada and the Davis campus of the University of California, using early production models of the machines. Results of the experiment indicate that the system is feasible and convenient for routine interlibrary use provided that improved reliability and consistency of copy quality is attained in later production models. Transceiving time for an average 10-page request is about one hour. An average total elapsed time of 4 hours for completion of requests can readily be achieved. Quality of copy is adequate for most library materials when the machines are functioning properly, a condition which occurred less than 2/3 of the time with the early production models used in this test. Total operating costs for the system average about $9.85 per 10-page transmission. Appendices include technical aspects of the system, costs, and examples of telecopied materials. (Author/RM)

ED032075

LE 001325

TELEFACSIMILE SERVICES BETWEEN LIBRARIES WITH THE XEROX MAGNAVOX TELECOPIER

by

H. G. Morehouse

A STUDY PREPARED FOR

COUNCIL ON LIBRARY RESOURCES, INC.
(CLR-314)

December 20, 1966

UNIVERSITY OF NEVADA LIBRARY
RENO, NEVADA

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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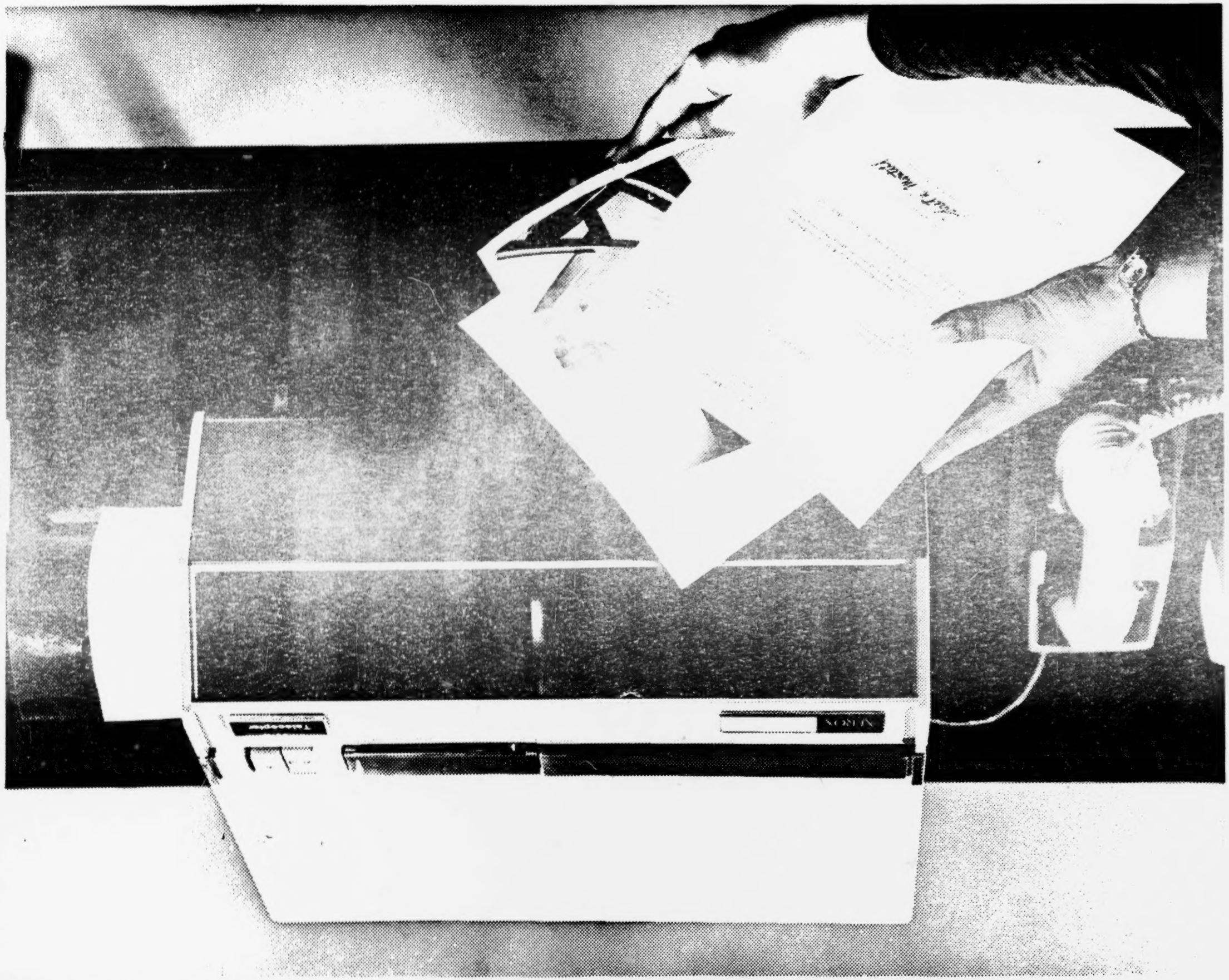


I. ABSTRACT

A 30-day test of the Xerox Magnavox Telecopier was conducted in order to evaluate its feasibility as a means of transmitting printed pages between libraries, primarily as a faster alternative to the usual method of mailing a Xerox copy of a journal article from one library to another in response to a mailed request.

The test, financed by the Council on Library Resources, was conducted between the Reno and Las Vegas campuses of the University of Nevada and the Davis campus of the University of California, using early production models of the machines.

Results of the experiment indicate that the system is feasible and convenient for routine interlibrary use provided that improved reliability and consistency of copy quality is attained in later production models. Transceiving time for an average 10-page request is about one hour. An average total elapsed time of 4 hours for completion of requests can readily be achieved. At 1000 pages per month, an appropriate volume of use for this system, operating cost is $4.60 per 10-page transmission, excluding any telephone line costs. Total costs for such a transaction, including all staff time and a $3.00 telephone line charge average about $9.85.

Quality of copy is adequate for most library materials when the machines are functioning properly, a condition which applied less than 2/3 of the time with the early production models used in this test.

II. BACKGROUND

For a number of years libraries have been interested in the concept of rapid transmission of printed pages from one library to another, using electronic devices. Much progress has been made in the technology of facsimile transmission, so that capabilities in this field which were formerly available only to newspapers, wire services, or other agencies able to pay for high-cost services are now available at costs low enough to warrant the exploration of their feasibility for library use.

One of the newest such devices to come on the market is the Xerox Magnavox Telecopier, a relatively simple, low-cost telefacsimile system which uses an ordinary telephone handset as the connecting link between machines.

The Council on Library Resources on June 7, 1965 authorized a grant to the University of Nevada Library in order to test this system and to study its feasibility for library use. Due to repeated production delays the equipment was not available until April 1966, and the test was completed in May. This paper reports the results of the experiment.

III. EQUIPMENT

A. General Description

The Xerox Magnavox Telecopier system consists of a transceiving unit and a telephone coupler at each station. (See Figure 1). Copies of printed pages, typescript, manuscript, or illustrative material may be transmitted for any distance over a single voice-grade telephone line, to any location where there is a telephone and a corresponding telecopier unit. This equipment will accommodate single sheets only, and will not copy directly from books.

The transceivers are relatively small, portable desk-top units roughly comparable in size and weight to an electric office typewriter. (See Appendix I - Specifications for a more detailed description).

There is no installation procedure necessary other than plugging a cord into a regular 110-volt A.C. outlet. The communication link is effected by first establishing voice contact via a telephone call from one station to another; when one operator has copy ready to transmit and the other is ready to receive, both operators place their telephone hand-sets into the phone couplers. The transmission link is thereby established and the transceiving automatically begins. (See Appendix II - Method of Operation for a description of operating procedures).

A full 8½" x 11" page may be transmitted in less than 6 minutes. Scanning proceeds at the rate of 180 lines per minute, at 96 lines per inch, so that a page with 5 inches (vertical measurement) of typescript, for example, may be transmitted in less than 3 minutes.

Copies are received on ordinary paper, the facsimile being produced by pressure of a stylus through carbon paper. Since stylus pressure

varies with the intensity of the signal produced by the scanner in response to various degrees of darkness in the image, half-tones are reproduced fairly well. (For technical details, see Appendix III - Technical Features).

B. Transmission Link

For general use, the Magnavox uses a voice-grade telephone line for a transmission link. No interface or connecting equipment is required, since the connection is established as described above by placing a telephone handset in the acoustic coupler attached to the Magnavox unit.

For use between locations where there is a continuing high volume of telefacsimile transceiving, a leased line appears to be desirable. This is justifiable in part for quality and reliability of performance as well as on economic grounds. (Cost factors are discussed in Section VI). Since ordinary telephone communications are occasionally subject to variations in quality (line noise, "poor connections", weak volume, etc.), and such variations can effect the quality of telefacsimile copies, there is some loss of reliability from this factor.

Although the experiment reported here did not incorporate a controlled comparison of results between ordinary telephone connections and a leased line, the investigators believe that such a line would be preferable for telefacsimile use between distances on the order of 50-200 miles, and for longer distance if warranted by volume of use. It should be noted that at slightly higher cost, higher quality (data-grade) lines are available which might virtually eliminate telecopy failures due to transmission link quality or reliability problems.

Since many journal articles are printed in type faces smaller than 8-point, and the Xerox Magnavox Telecopier is not advertised by the manufacturers as being capable of reproducing pages printed in 6-point or smaller type, the use of this machine for general interlibrary transfer of materials requires operation at or near the borderline of its capabilities. Test results bear this out, and show that there are some library materials which cannot be successfully transceived by this system. (See Section VII - Quality).

In order to fully explore the capabilities of this equipment, selected samples of types of materials were "telecopied", as listed below:

1. Printed pages of various type sizes and faces, and Xerox copies of same.
2. Typescript pages (elite and pica), and Xerox copies of same.
3. 1st, 2nd, and 3rd carbon copies of same.
4. Manuscript pages of various degrees of clarity, and Xerox copies of same.
5. Line drawings, graphs, and charts, and Xerox copies of same.
6. Colored materials, including papers of various colors and shades, and printing with various colors of ink.
7. Photographs and other illustrative materials with half-tones, both in color and black-and-white.
8. Newspaper copy.
9. Catalog cards, both typed and LC printed.
10. Book order forms.
11. Interlibrary loan forms.
12. Maps.

IV. GENERAL DESCRIPTION OF TEST

A. Locations

Three university campuses were involved in the test. The Reno campus of the University of Nevada was the base of operations, linked to the Davis campus of the University of California and the Las Vegas campus of the University of Nevada (Nevada Southern University). Distances involved were Reno-Davis, 120 airline miles, and Reno-Las Vegas, 345 airline miles. (No direct transceiving was performed between Davis and Las Vegas, although it would have been possible, at some expense, through normal long-distance telephone channels).

One Xerox Magnavox Telecopier was installed at each location, plus one spare unit held at Reno for use as a replacement in case of a major failure in any of the other machines. (The availability of this fourth machine proved to be of crucial importance as the test progressed. See Section VII - Reliability).

B. Time Schedule

The test was scheduled to run for 30 days (approximately 20 working days), with four hours of transceiving per day between Reno and Davis and four hours daily between Reno and Las Vegas. Reno-Davis operations were conducted from 1-5 p. m. daily, and Reno-Las Vegas operations from 6-10 p. m.

C. Materials Transmitted

The library materials of most interest for this experiment were copies of journal articles, this being the type of material most frequently transferred between libraries, where the conventional method entails the mailing of the desired copy (typically produced on a Xerox 914) in response to a request form received by mail.

D. Telephone Line Arrangements

The special arrangements set up for telephone lines to be used during this short experiment should not be considered as typical or optimum arrangements for a permanently installed library telefacsimile operation.

The best and most economical arrangement for the 120-mile interstate connection between Reno and Davis would have been a leased line at about $300 per month. Since such a line could not be made available at the time of the experiment, it was necessary to use a WATS line (Wide Area Telephone Service) as the next best alternative, at $800 per month.

An Area I WATS line consists essentially of a special billing arrangement with the telephone company whereby for a flat rate of $800 per month, the subscriber's switchboard plug is available 24 hours per day for interstate calls to any point in adjacent states. This arrangement was advantageous for the reason that when the line was not being used for telefacsimile operations, it was available to the university switchboard operators for routing of a large percentage of the general long distance calls handled by them. Thus, the University of Nevada was able to pay for ½ the cost of this line leaving only $400 to be paid by the telefacsimile project. On this basis, however, the line was available for telefacsimile transmission only during the regularly scheduled 4 hours each afternoon.

For the connection between the Reno and Las Vegas campuses, the Governor of the State of Nevada, Grant Sawyer, generously made his personal intrastate WATS line available to the University each evening for 30 days as a contribution toward the support of the experiment.

E. Procedures and General Approach

In addition to the testing of the system's technical capabilities and limitations with various selected sample materials, an effort was made to fill as many actual interlibrary loan requests as possible during the course of the experiment. This portion of the test was conducted primarily between Davis and Reno, since a fairly large continuous flow of interlibrary loan transactions normally exists between these campuses (mostly from Davis to Reno). The purpose was to evaluate the utility of the Telecopier system in actual interlibrary loan operations, as to convenience, cost in staff time, and typical elapsed time required for filling of requests.

A special form was devised for transmission of requests. (See Appendix IV). The form was designed with the idea of compressing the essential information in a small area near the top of a page, so that a request could be transmitted in about 1½ minutes. The remainder of the page was designed as a record sheet for information applicable to the test, to be filled in at the point of origin.

An alternative method was also used, whereby requests were transmitted verbally by telephone. This method was found to be practical for most requests, although lengthy and complex citations, especially in foreign languages, caused some difficulties. In general, the results showed that telecopied written requests were more efficient, using the form designed for this purpose. However, under the special conditions of this experiment, where telefacsimile operations between Davis and Reno were conducted only during the afternoons, it was found that elapsed time for completion of interlibrary "loan" transactions could be minimized by verbally telephoning the requests in the morning

from Reno to Davis. The needed materials were copied and ready to transmit from Davis by 1 p.m., when the daily telefacsimile operation began. Thus, a request originating at the Interlibrary Loan Office at Reno before 10 a.m. could normally be filled by mid-afternoon of the same day.

If the Telecopier were adopted for permanent installation and regular full-time availability for use between two or more libraries, it appears that the best technique would be to transmit special written request forms rather than verbally telephoning the requests. The elapsed time averages about the same as that required by a telephone conversation, while errors and misunderstandings are avoided.

The experience provided by the evening transmissions between Reno and Las Vegas showed that elapsed time for completion of requests averaged more than twice as long as the time required with daytime operation. Although evening telephone rates are lower, and telefacsimile service using a line available only in the evening might be thought of as a practical mode of telefacsimile operations, certain problems arise in connection with night work. Regular Interlibrary Loan Office personnel normally work from 8 a.m. to 5 p.m., with no staff on duty in the evenings. If requests are received via telephone or telefacsimile in the evening, searching, paging, and copying of wanted materials cannot readily be done by the Telecopier operator, who normally does not leave the machine for extended periods. It would seem an impractical expense to pay the salaries of two persons serving such a small-scale telefacsimile operation in the evening, one of whom would be doing work which could be absorbed with little difficulty by regular daytime staff if performed during the day. Unless fairly generous evening staffing arrangements

are made, evening telefacsimile service results in an elapsed service time of two days as follows:

1. Patron submits request before about 5 p. m. (e. g., on Monday).
2. Request is telephoned or telecopied to other library that evening.
3. Material is searched, retrieved, and copied during the following day (Tuesday).
4. Material is telecopied to requesting library that evening, or negative reply is transmitted if material is not available.
5. Material or negative reply is available to patron on the next day (Wednesday).

Thus, it appears that telefacsimile operations restricted to evening hours are not likely to provide the fast service of which such systems are capable, and should be considered only if:

1. Telephone lines are available at night at no cost, or very low cost to the telefacsimile service,

or,

2. Searching, retrieving, or copying services can feasibly be made available during the evening hours of operation.

V. TIME

A. Transceiving Time

The Telecopier can indeed transmit, as advertised, a full 8½" x 11" page in 6 minutes. In actual practice, most pages require approximately 5 minutes to transmit, and short pages take considerably less time, since the operator at the transmitting end can usually observe when the machine has reached the end of the printed copy and has begin to transmit the blank margin at the bottom of the page. At this time the operator stops the machine and prepares to send the next page.

Since the scanner proceeds by making full horizontal sweeps, width of the copy on the page has no effect on transmitting time.

During the experiment an effort was made to transmit narrow samples more rapidly by turning them sideways so as to be scanned vertically instead of horizontally. The resultant copy quality was so poor for conventional type faces that this method was deemed not feasible. (Apparently legibility is adversely affected by vertical scanning at 96 lines per inch, since the thickness of vertical components of this type face is caused to vary greatly, and the serifs confuse the eye by varying in length).

Scanning proceeds at the rate of 180 lines per minute (96 lines per inch) resulting in a transmitting speed of 1.875 inches per minute (measured vertically on the page), or conversely, .533 minutes (32 seconds) per inch.

When using the machines, it becomes immediately obvious that the rate of transfer of administrative information can be considerably speeded by altering conventional formats of memos, forms, etc., by

filling the page more completely, eliminating side margins and horizontal empty spaces. An item thus altered may often be transmitted in 1/3 to 1/2 the time required by the same item in conventional format. This technique, of course, would apply only to administrative communications prepared especially for telecopying and has little application for library materials.

B. Operator Time

Time spent in actual operation of the Telecopier may be categorized into three main divisions, as described below.

1. Telephone time (verbal)

This time factor varied considerably with the nature of the transaction and averaged much less per page during transmission of larger jobs. The minimum length of conversation between transmissions was about 5 seconds, with the maximum for normal operations about 1 minute, and the average on the order of 20 to 30 seconds per page. The most time-consuming portion of the telephone conversation occurred at the beginning of each transaction, while one operator notified the other operator what was about to be sent. Some telephone time was also used in discussing availability or non-availability of requested material, and for inquiries about status of requests.
One advantage which becomes apparent with respect to the frequent telephone contact between libraries was the informal and accomodating attitude generated by constant communications between operators. This seemed to result in faster and better service than is generally elicited by the more formal conventional interlibrary loan correspondence. It is difficult to assess the

importance of this factor, since there are many other factors in a telefacsimile operation which both stimulate and facilitate faster service. Nevertheless, the excellent personal communications inherent in the system seemed to promote highly effective working relationships between the libraries involved.

2. Make-Ready Time

Since operating these machines is a relatively simple process, an experienced operator can prepare to send or receive a page in as little as 10 seconds. Average make-ready time is approximately 20 seconds.

3. Operator Waiting Time (Transceiving Time)

Observers of the Telecopier system in action are invariably impressed by the seemingly long periods of waiting for the machine to finish scanning or receiving copy. Our operators, who were also typists, experimented with utilizing this time by typing memos and correspondence while the machine was in operation. The conclusion from this test is that about 75% of actual transceiving time can be utilized by an operator for other work. However, the noise level of the machine is high enough and of a distracting enough nature so that some operators could not type as efficiently as under normal conditions, while other operators were apparently little affected by the noise.

C. Elapsed Time for Filling of Requests

Since telephone lines were not available full-time for this experiment, as noted in Section IV, average elapsed time for filling Interlibrary Loan requests was increased. However, enough experience

was obtained to show what service times can be expected under normal operations with full-time availability of the telephone lines.

Under the conditions of the experiment, elapsed time for completion of an average request with this system, assuming constant ready access to the telephone line, and assuming no machine malfunctions, was about 3 3/4 hours. (There were so many malfunctions with these early production models, some of long duration, that the machine "down-time" experienced was not taken into account in computing service time capabilities under normal conditions with presumably more reliable equipment).

Completed requests averaged 10.7 pages in length. The measured time factors are indicated in Table I.

These figures are based on the work experience gained on actual interlibrary loan requests completed during the 30-day experiment. This average elapsed time was achieved by placing high priority on telefacsimile work performed by Interlibrary Loan Office personnel, with machine operators constantly available, having no other prime duties during the times that the system was in operation. If somewhat longer elapsed times are acceptable, it appears feasible to install this equipment in an Interlibrary Loan Office to be operated on an intermittent or occasional basis by existing staff, without hiring an additional person as operator.

Significant savings in elapsed time were realized by using special procedures in handling requests. Verification of bibliographic information was performed only in cases where it appeared necessary. Searching and retrieving were performed as soon as conveniently possible for each request, and top priority access to a Xerox 914 was assigned

TABLE I

MEASURED WORKING TIME ELEMENTS FOR COMPLETED REQUESTS
Requested items ranged from 1 to 21 pages in length.
Average length of transactions: 10.7 pages

Time Factor	Minutes per page			Minutes per Transaction (Average)
	Minimum	Maximum	Average	
Telephone (Verbal)	.08	3.0	.4	4.3
Make-Ready	.17	.5	.3	3.2
Transceive	2.00	5.8	5.0	*57.5
TOTALS			5.7	65.0

Total Telecopier Working Time per Transaction: 1 hour, 5 minutes.
(Approximately 45 minutes of this time is available to the operator for other work).

* Includes 4 minutes per transaction (average) for transmitting request, either verbally or via telecopier plus any necessary verbal communication.

TABLE II

ELAPSED TIME ANALYSIS FOR COMPLETED TELEFACSIMILE TRANSACTIONS
Requested items ranged from 1 to 21 pages in length.
Average length of transactions: 10.7 pages

	Time Factor	Average Working Time	Average Subsequent Delay Time	Elapsed Time		
				Minimum	Maximum	Average
Requesting Library	Receive Request	5	5	3	15	10
	Search, verify as required, determine Source Library	7	5*	1	30	12
	Transmit Request	4	11	3	20	15
Source Library	Receive Request					
	Search Catalog	5	20	5	105	25
	Retrieve	15	32	5	300	47
	Copy (Xerox 914)	10	34	2	120	44
	Transmit Item	61	7	9	190	68
Requesting Library	Receive Item					
	Notify Requester, file Request Form	4	-**	-	-	4
	TOTALS	111	114	-	-	225

Average Elapsed Time Per Transaction: 3 hours, 45 minutes.

* Delay time is estimated, assuming full-time availability of telephone line. The 5-minute average may seem short, but it should be noted that a request may be transmitted at any time, even while transceiving is under way, by momentarily interrupting (between pages) the work in progress in order to transmit the new request.

** Not computed because of insufficient data.

to the telefacsimile operation, thus minimizing waiting time for copying.

Table I shows the working times experienced in Operating the telecopier. As indicated above, as much as 75% of this time could be used by the operators for other work while the machines are in operation.

Table II shows the average elapsed time achieved in completing requests. These figures are based on the measured time for all actual interlibrary loan requests successfully completed during the 30-day experiment, adjusted to eliminate the factors of machine malfunctions and of time periods when the telephone line was not available.

Delay times would vary from one library to another, and would be determined largely by the volume of work being handled at a given time with respect to a given capacity in terms of staff and equipment. The elapsed times experienced during this test, as shown in Table II, are believed to be close approximations of the performance of this system to be expected in a fairly typical library working situation.

D. Comparison with Conventional Interlibrary Loan Elapsed Time

The Telecopier average elapsed time of 3 3/4 hours per completed transaction may be compared to times required under the typical Xerox-mail procedures, which vary from 3 days to 3 weeks. (Times much longer than 3 weeks are often experienced, but such long delays are usually caused by non-availability of the desired material at the lending library, a difficulty which would also plague an interlibrary telefacsimile system).

As a basis for comparison, an analysis was made of the elapsed times required to complete Xerox-mail transactions at the University of Nevada, Reno campus. (See Table III). The transit times via

U. S. mail vary greatly according to location of the lending library and are shown here for average experience with distances between 100 and 500 miles.

Other bases for comparison may be found in the literature. Cruzat[1] reports elapsed time of 2-6 days for Xerox copy transactions between libraries primarily within one large metropolitan area. The Houston Research Institute[2] maintains that "2 to 4 weeks, with 3 weeks as a rough average" are required for interlibrary loan transactions between technical information centers. Cartwright[3], at the Institute for Library Research at Berkeley, found an average of 6-7 working days required for interlibrary loans between University of California campuses.

The major portion of the time gained by using the Telecopier was realized in the transmission time itself. A large gain was also derived from reduced delay times, partly due to the smaller number of individual steps or operations required by the telefacsimile procedure, and partly due to the fact that higher priority was placed on rapid completion of telefacsimile transactions than is normally placed on interlibrary loan work.

The actual working time saved by the special procedures used in handling requests was 30 minutes per transaction. This represents

[1]Cruzat, Gwendolyn S. Evaluation of the Interlibrary Loan Service, Wayne State University Medical Library, II: Length of Time in Processing Interlibrary Loans. (Report No. 5) Detroit, Wayne State University, School of Medicine, Library and Biomedical Information Service Center, 1965.

[2]Facsimile Transmitted of Technical Information. Houston, Texas, Houston Research Institute, 1965.

[3]Cartwright, Kelley. A Proposed System for Intercampus Circulation. Berkeley, University of California, Institute of Library Research, 1966.

less than 1% of the total time gain. About 66%, or 2/3 of the time gained by using Telecopier was due to superior transmission speed as opposed to mail transit time. About 32% of the time gained was due to reductions in delay time.

It may be argued that, in many situations, 1 or 2-day mail service is available, and that fairly rapid elapsed times could be achieved merely by reducing delay times in conventional interlibrary loan procedures, without resorting to telefacsimile devices. This is obviously true if delay times can in fact be significantly reduced. Large reductions in delay times are difficult to achieve in general interlibrary loan operations, but can more readily be achieved when 2 or more libraries cooperate in a vigorous mutual effort to streamline procedures and to expedite service to each other. This is the sort of cooperative arrangement that would normally tend to be developed in connection with an interlibrary telefacsimile network, in order to realize the full advantage of the rapid transmission capability.

TABLE III

ELAPSED TIME ANALYSIS FOR COMPLETED CONVENTIONAL INTERLIBRARY PHOTOCOPY TRANSACTIONS (XEROX-MAIL)

Based on Interlibrary Loan Office Experience at the University of Nevada, Reno Campus

	Time Factor	Working Time		Subsequent Delay Time	
		Hours	Minutes	Hours	Minutes
Requesting Library	Receive Request		5		15
	Search, verify, determine Source Library		25		5
	Type Request		4	2	
	Proof-read and approve request, file copy, place in out-going mail		3	4*	
	Mail Pickup	--	--	--	--
	In Transit	$2\frac{1}{2}$ Working Days **			
Source Library	Mail Delivery	--	--		15
	Open ILL mail, sort		1		45
	Search Catalog		5	4***	
	Retrieve		15	4	
	Copy (Xerox)		10	1	
	Prepare for mailing, file request form		6	4	
	Mail Pickup	--	--	--	--
	In Transit	$2\frac{1}{2}$ Working Days			
Requesting Library	Mail Delivery	--	--	--	15
	Open ILL mail, sort, pull file copy of request		2		45
	Notify patron, refile request form		4		
	TOTALS		80	19	140
	TOTAL TRANSIT TIME	5 Working Days			
	TOTAL WORKING TIME	1 Hour, 20 Minutes			
	TOTAL DELAY TIME	2 Working Days, 5 Hours, 20 Minutes			
	TOTAL ELAPSED TIME	7 Working Days, 6 Hours, 40 Minutes Approximately 8 Working Days Approximately 11 Calendar Days			

* One outgoing mail pickup per day.

** Transit time based on experience with libraries between 100 and 500 miles distant.

*** Delay time reflects waiting time for once-daily retrieval of materials from branch libraries on campus.

TABLE IV

TIME COMPARISONS BETWEEN TELECOPIER AND CONVENTIONAL (XEROX-MAIL) TRANSACTIONS

Time Factor	Telecopier	Conventional ** (Xerox-Mail)	Difference
Working Time	50 min. *	80 min.	30 min.
Delay Time	114 min.	2 days, 5 hrs, 20 min.	2 days, 3 hrs.
Transmission Time	61 min.	5 days	4 days, 7 hrs.
TOTAL ELAPSED TIME	225 min. (3 hrs, 45 min.)	7 days, 6 hrs, 40 min.	7 days, 3 hrs.

Days = 8-hour working day

* Excluding transmission time

** Based on Table III

VI. COSTS

A. Equipment

The Xerox Magnavox Telecopier is priced, in typical Xerox Corporation fashion, on a lease basis. The minimum monthly charge for one machine is $50.00, which includes 600 minutes of machine time (recorded on a meter) or theoretically at least 100 pages transmitted or received. Additional minutes beyond the 600 for each machine are charged at $.025 per minute. Since two machines are involved in each transmission these figures must be doubled, resulting in machine cost per page ranging from $1.00 at 100 pages per month to about $.34 at 1600 pages per month (maximum single-shift capacity; see Figure 2).

B. Telephone Line Costs

1. Local Telephone Service

For telefacsimile service between points within a local area where no long-distance telephone charges are involved, the telephone costs for this system are negligible, and are not taken into consideration in these cost analyses.

2. Direct Distance Dialing

For operations between several libraries at various distances involving long distance telephone charges, or for occasional operations between two libraries distant from each other, ordinary station-to-station toll charge calls may be the most appropriate type of telephone service for this system.

Costs for a 10-page transaction (1 hour of telephone time) would vary according to the distance involved. Typical charges

Figure 2

MACHINE COST PER PAGE AT VARIOUS VOLUMES OF USE

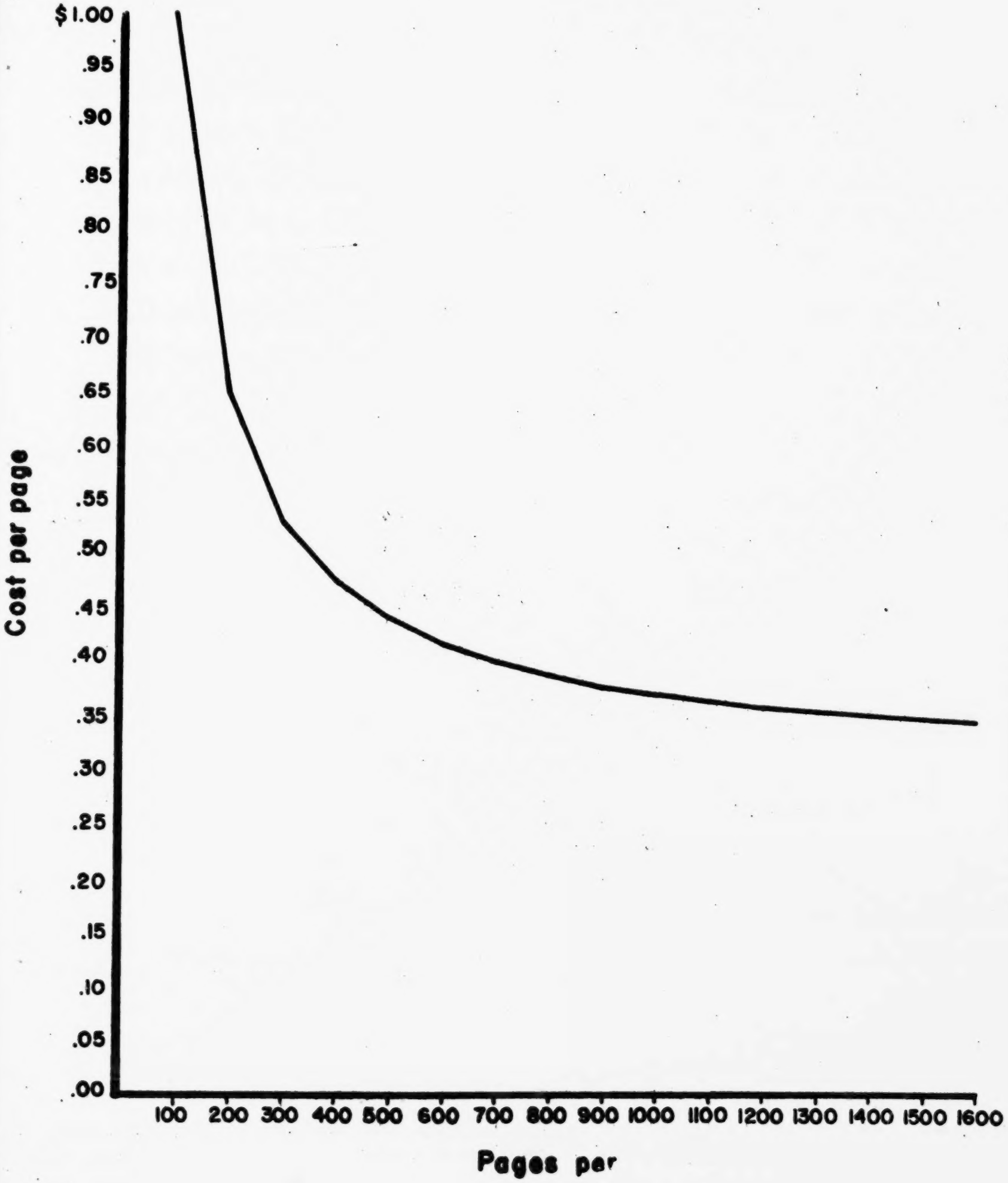
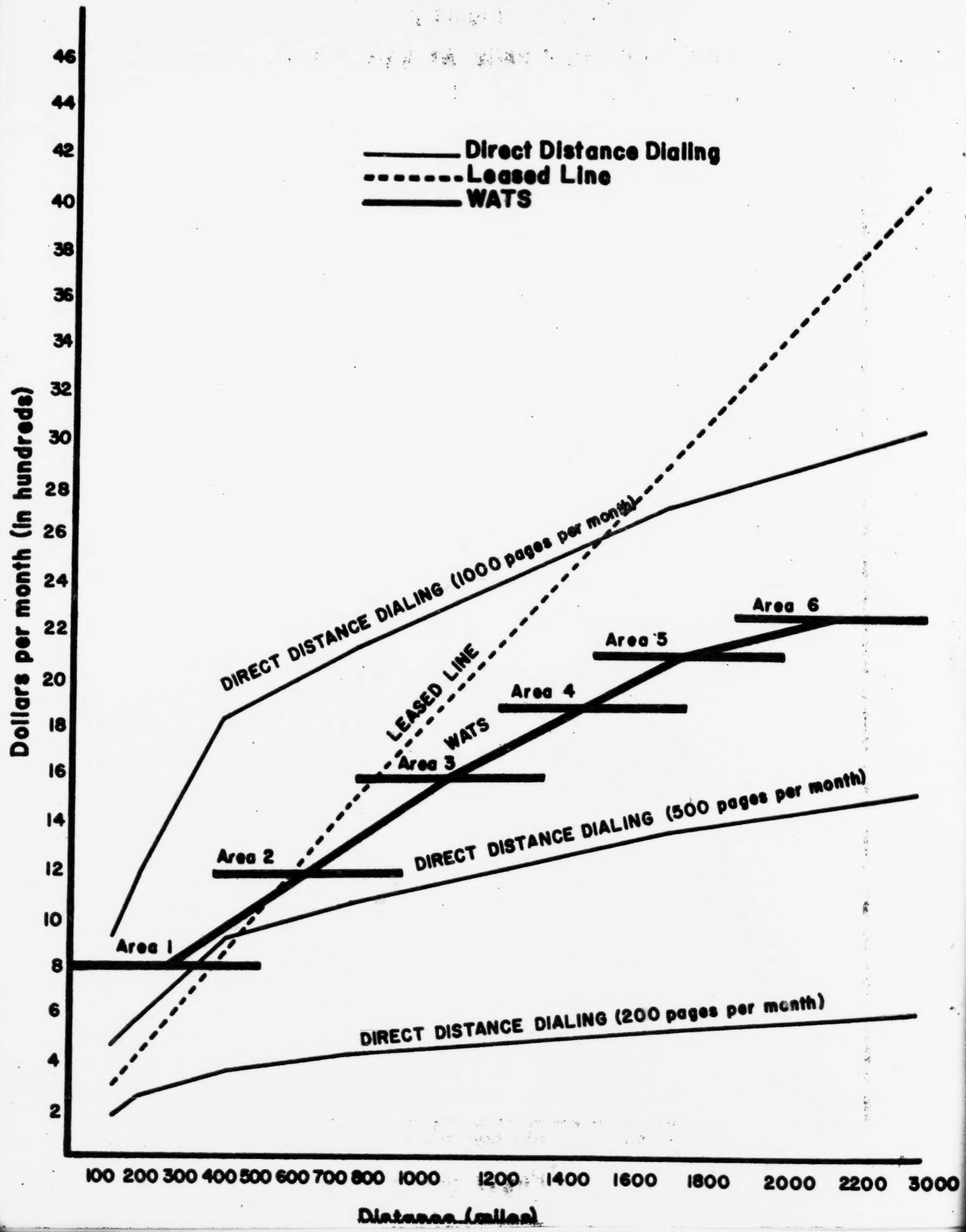


Figure 3
MONTHLY TELEPHONE LINE COSTS



for various interstate distances are indicated by the following examples:[1]

120 airline miles	$ 9.15
427 airline miles	18.30
787 airline miles	21.35
1683 airline miles	27.45
2393 airline miles	30.50

It should be noted that with Direct Distance Dialing, telephone line rates are independent of volume of use, so that telephone cost per page or per transaction would be the same at very low or very high volumes of use.

3. **WATS**

Wide Area Telephone Service, usually referred to as WATS, might be the most appropriate service for a heavily used telefacsimile system involving several libraries within a state or within a region involving several states.

Interstate WATS provides unlimited telephone service to any point within a specified area at a flat monthly rate. Specified areas range in size from a small number of adjacent states (Area 1) to an area encompassing the entire United States (Area 6) at monthly charges ranging from $800.00 to $2,285.00.

Volume of use is a key factor in determining telephone line costs for telefacsimile use under this type of service. For example, an Area I full-time WATS line (e. g., from Nevada to any point in California, Arizona, Utah, Oregon and Idaho) at $800.00 per month would result in telephone cost per ten-page transaction of $8.00 if volume of use is 1000 pages per month. At 1500 pages

[1] These costs may vary from one region to another. Exact rate for communication between any two specific points may readily be obtained from a telephone company office at either point.

per month, the telephone cost per transaction drops to $5.33.

A variation of WATS is available in the form of a reduced flat rate for service limited to 15 hours of use per month, with an additional hourly charge for each hour used beyond the first 15. For an Area 1 measured-time WATS line the monthly cost would be $300.00 for the first 15 hours, and $17.00 per hour thereafter. This variation does not appear to be practical for use with the Telecopier system since telephone costs per hour would range between $17.00 and $20.00 per transaction, a higher cost than would be incurred if Direct Distance Dialing were used between most points within the same area.

4. Leased Line

For high-volume Telecopier operations between two libraries within several hundred miles of each other, a leased line (tie-line) appears to be the most economical type of telephone service. For example, an interstate leased line 100 miles long (connecting two points only) costs approximately $300.00 per month, and is available 24 hours a day. At a volume of 1000 pages per month, telephone costs per transaction would approximate $3.00, which is about 1/3 of the telephone cost per transaction with Direct Distance Dialing.

For very long distances, the leased-line loses its economic appeal, since such a line from Reno to New York City would cost more than $4,000.00 per month, resulting in a telephone cost per 10-page transaction of over $40.00, over 30% higher than the cost of Direct Distance Dialing.

C. Staff Time Costs

As indicated in Section V, working time per 10-page transaction

Figure 4

OPERATING COSTS PER PAGE AT VARIOUS VOLUMES OF USE

(INCLUDES COSTS FOR EQUIPMENT, SUPPLIES, AND OPERATOR'S LABOR @$2.40 per hour)

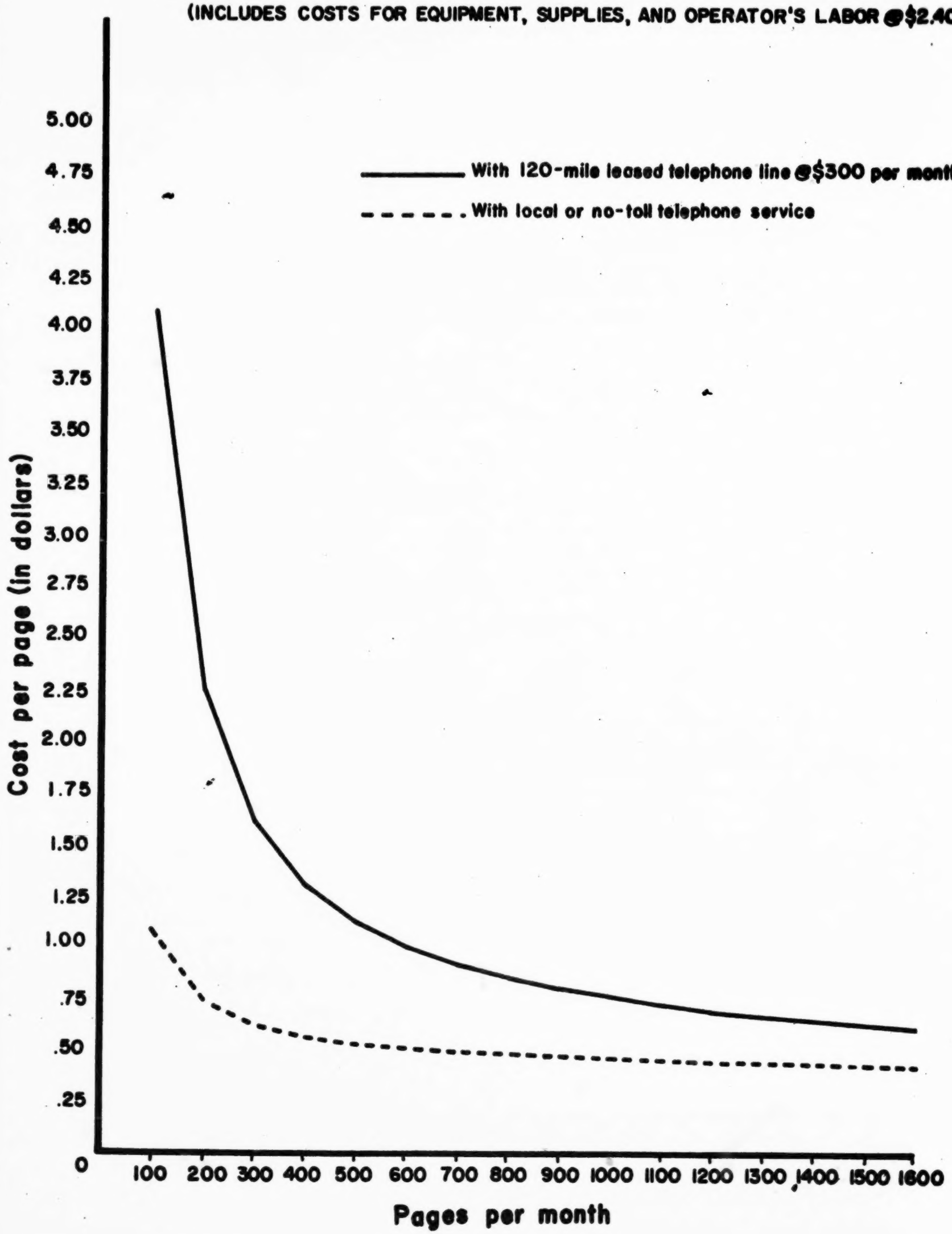
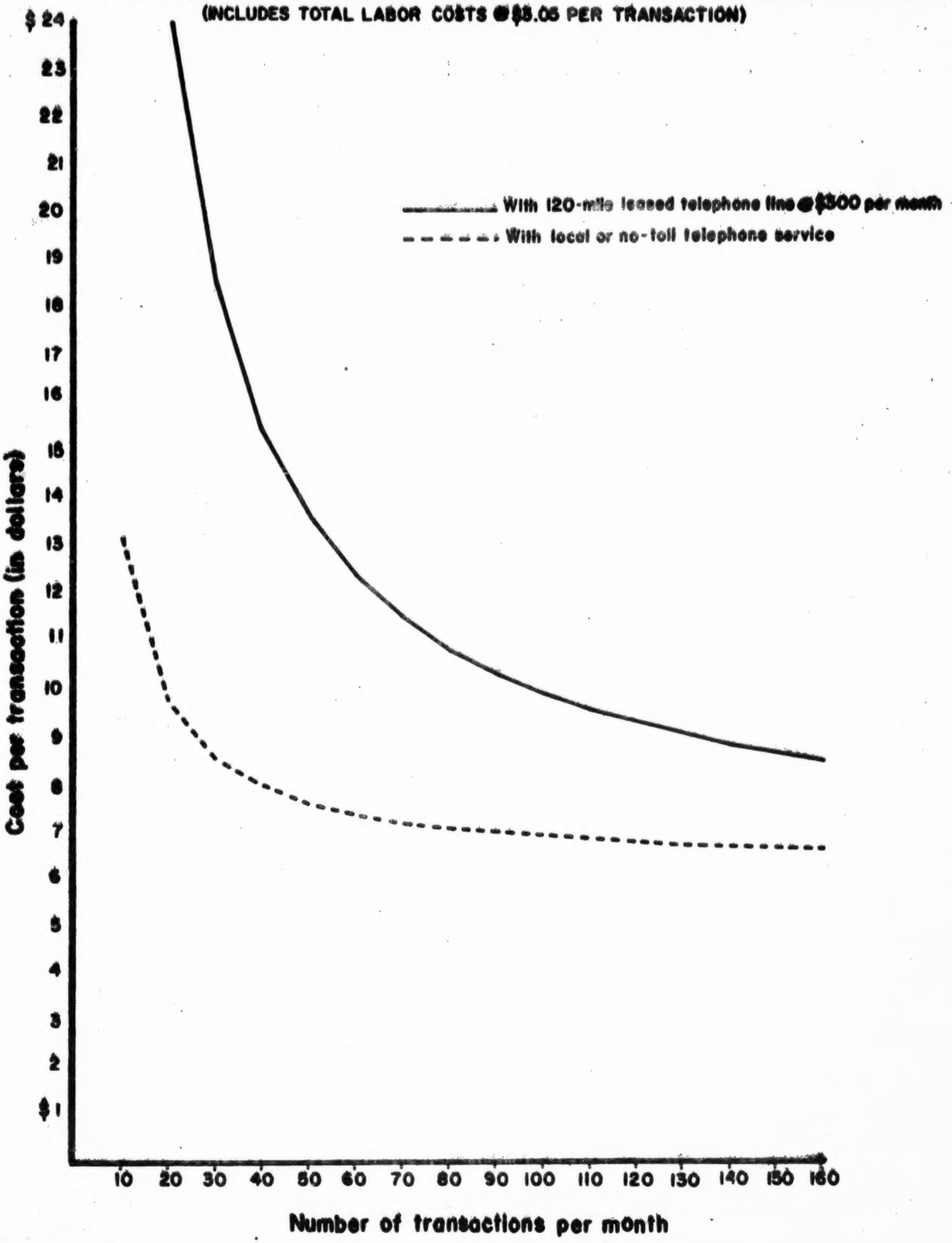


Figure 5

TOTAL COST PER TEN-PAGE TRANSACTION AT VARIOUS VOLUMES OF USE

(INCLUDES TOTAL LABOR COSTS @ $5.05 PER TRANSACTION)



for actual operation of the equipment is approximately 1 hour. About 45 minutes of this time may be utilized for other work while the machines are operating, resulting in a cost for 15 minutes of time at the transmitting station plus 15 minutes at the receiving station.

In addition, about 50 minutes of working time per request is expended in searching, verifying, retrieving, etc.

Thus, approximately 80 minutes of staff time per transaction computed at $2.00 per hour yields a staff time cost of $3.33.

D. Total Cost

Operating costs per page with this system are summarized in Figure 4, including equipment, supplies, telephone line costs, and labor costs incurred in actually operating the equipment. A more detailed breakdown of operating costs is presented in Appendix V.

Figure 5 indicates average total cost per 10-page transaction, including all working time spent in both the sending and the receiving libraries.

One cost factor not included in any of the figures or tables is the cost of making a Xerox or other form of copy of the pages to be transmitted. This cost might vary from one library to another but would need to be added in estimating total cost per transaction for most typical interlibrary telecopy work.

Total cost per 10-page transaction with the volume of use at 1000 pages per month is nearly $7.00 where no telephone charges are incurred, and $10.00 or more where long-distance telephone line charges are added.

VII. QUALITY

A. Reliability

It is very difficult to assess accurately the reliability of the Xerox Magnavox Telecopier on the basis of this test, since the machines used were among the first of the new product to come off the assembly line. In spite of the fact that an extra machine was available for spare parts, at least one of the three machines used was either malfunctioning or not functioning over 1/3 of the time during the 30-day experiment.

Several factors apparently contributed to this poor record:

1. The service representatives, although evidently compentent, were newly trained, and had obtained little experience in repairing and adjusting these machines.

2. The telephone line quality was not consistently good, especially between Reno and Las Vegas. Some of the transmission failures are thought to have resulted from poor connections.

3. The equipment was so new that it was not yet available on the market at the time this test began. The "bugs" and weak points in the machines had not all come to light in the way in which they inevitably will under constant everyday use.

Equipment of this sort is certain to break down or go out of adjustment at times, even after reliability has been improved. It should again be noted that no allowance is made for such failures in the preceding time and cost analyses.

B. Copy Quality

There was great variation in the quality of copy produced during this test, due both to inconsistent performance of the machines, and, to a lesser extent, to variations in quality of the telephone connections.

The assortment of sample materials transmitted is listed in Section IV-C. The quality of reproduction of these materials may be summarized as follows, describing only the performance obtained while the machines were functioning well:

1. Good legible copies were obtained from the following types of materials:

   (a) Printed pages of 8-point and larger type faces.
   (b) Typed pages, pica and elite.
   (c) Average quality carbon copies of typed pages.
   (d) Holograph pages of reasonably good clarity, both pencil and ink.
   (e) Line drawings, graphs, and charts.
   (f) Photographs with good contrast.
   (g) Colored printing and illustrative materials with good contrast. (Telecopies are in black and white.)
   (h) Printed forms of various types.
   (i) Newsprint of average quality.

2. Fair copies of borderline legibility were obtained from the following types of materials:

   (a) Printed pages of most 6-point type faces.
   (b) Fuzzy, smudged, or otherwise unclear carbon copies.
   (c) Photographs or other illustrative materials, both color and black and white, with less than average contrast.
   (d) Xerox copies of less than average quality.
   (e) Italic type faces, 8-point to 6-point.
   (f) Most colored maps.

3. Generally poor copies, mostly or completely illegible, were produced from the following:

   (a) Any type face smaller than 6-point.
   (b) Black and white or colored printed or illustrative materials of very low contrast.
   (c) Italic type faces 6-point or smaller.
   (d) Faded manuscript or newsprint.
   (e) In general, any materials of very low contrast.

See Appendix VI for sample of copy quality.

VIII. CONCLUSIONS

A. Operating Characteristics

1. The Telecopier Magnavox is relatively simple to operate.
2. It is small and portable, usable at any location where there is a telephone.
3. The noise level during operation is high enough to be distracting to some personnel.

B. Time Requirements

1. Transceiving time for a 10-page transaction is approximately one hour.
2. Elapsed time for a complete interlibrary transaction can readily be held to an average of less than 4 hours (excluding delays due to machine malfunctions and to unavailability of requested materials).
3. Staff time per completed transaction is slightly less than that required for typical interlibrary Xerox-mail transactions. Working time can be saved by less formal requirements for verification of bibliographic information, and the smaller amount of paper work made possible by good communications and a system involving a close working relationship between two libraries.
4. During transceiving, about 75% of the operator's time may be used for other work such as typing, filing, or using another telephone.
5. Elapsed time for completing requests tends to be excessive when transceiving is carried on at night, unless adequate

evening staff time is available for prompt searching, retrieving, and copying services.

C. Cost

1. Total cost per completed 10-page transaction, excluding telephone line costs, is approximately $6.85 at a volume of use of 1,000 pages or 100 average transactions per month (a realistic anticipated volume for an installation in a library with workloads appropriate to this system). Telephone line costs range from 0 to $30.00 per transaction depending on distance, whether a day, evening night or weekend toll call, a WATS line, or a leased line is used and whether the telefacsimile service is absorbing the full cost of a leased or WATS line.
2. The cost appears to be within a reasonable range for ordinary interlibrary use at moderate distances, and especially reasonable where there is an urgent need for rapid completion of requests.

D. Quality

1. Copy quality appears to be adequate for most library materials at the resolution of 96 lines per inch when the equipment is performing properly. Some journal articles which include printed matter in type size smaller than 8-point, frequently in foot-notes or captions on charts, figures, etc., are of borderline legibility.
2. Copy quality for administrative materials (typed letters, memos, most printed forms) is quite adequate.
3. Reliability of the equipment was poor, with inconsistent copy

quality and frequent breakdowns. However, since the machines used in this test were very early production models, it seems reasonable to expect considerable improvement in this respect as experience is gained in the manufacture and servicing of the Xerox Magnavox Telecopier.

APPENDIX

APPENDIX I

SPECIFICATIONS, XEROX MAGNAVOX TELECOPIER

Manufacturer:	Magnavox Corporation
Marketed by:	Xerox Corporation
Size:	11" high, 18" wide, 15" long
Weight:	46 pounds
Power Supply:	110 volt, AC
Transmission Link:	Standard telephone handset, one voice-grade telephone line.
Input Pages:	Up to 8 3/4" wide by any length single sheets, any color.
Output Pages:	Same size as input page, black and white, with half-tones. Carbon imprint, 1 to 3 copies with each transmission.
Resolution:	96 lines per inch (generally adequate for 8-point type or larger).
Scanning Rate:	180 lines per minute
Production Speed:	6 minutes per $8\frac{1}{4}$ x 11" sheet 1.833 inches per minute (vertical measurement of page, any width up to 8 3/4").

APPENDIX II

METHOD OF OPERATION

1. Operators establish voice contact. Sender telephones recipient or vice-versa determining who will send what to whom.

   (a) Sender advises recipient as to length of item (no. and size of pages).

2. Both operators prepare to send and receive, respectively:

   (a) Sender places page to be transmitted in transparent plastic carrier, inserts in machine, presses SEND button.

   (b) Receiver places carbon set (sheet of carbon paper attached to plain white paper) in transparent plastic carrier, inserts into machine, presses RECEIVE button.

3. Still in voice contact, operators each advise when ready.

   (a) Recipient places telephone in the phone coupler.

   (b) Sender then hears "beep" tone, places telephone in phone coupler.

   (c) Transceiving automatically begins.

4. When sending unit has reached the end of the page, it will automatically stop.

   (a) Sender may terminate transmission at any time by opening the machine cover. Sending operator will normally do this to save time when it is apparent that all the copy on a page has been transmitted, and that the machine has begun to transmit the blank margin at the bottom of the page.

   (b) The recipient's machine operates in phase with the sender's machine, and will automatically stop when the latter stops.

5. Recipient removes newly received copy, picks up telephone to advise sender that satisfactory copy is received.

6. Sender picks up telephone to verify receipt of copy.

7. Procedure is repeated for additional pages. After all transceiving is completed, both operators replace telephones in cradles, and turn their machines off.

APPENDIX III

TECHNICAL FEATURES

Each telecopier contains the necessary components for both transmitting and receiving.

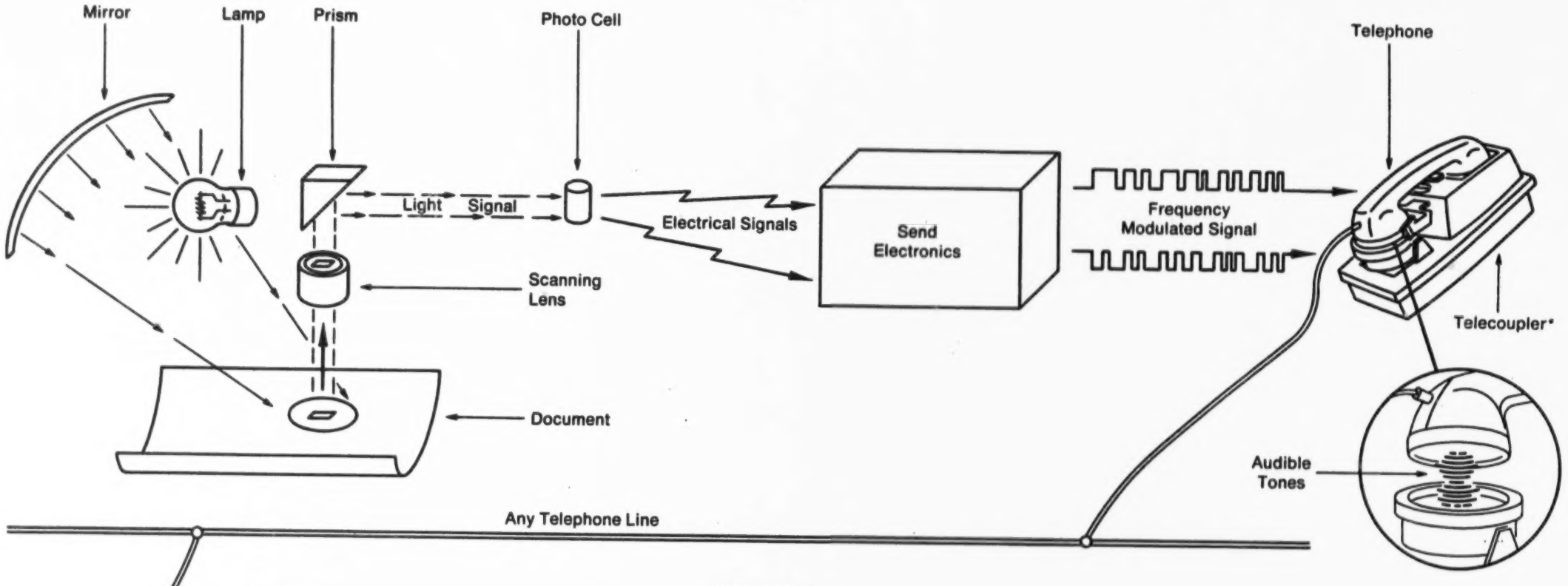
When sending, the image on the page to be transmitted is picked up by light reflected from the page into a rotating scanner. Each line of scanning, at 96 lines to the inch, thus creates a continuous beam of light which varies in intensity as it reflects the light and dark portions of the image. The beam of light is interrupted by a rotating "chopper", disc, breaking it into intermittent impulses of light which are absorbed by a photocell. The photocell converts the light impulses into AC electrical impulses, which are then amplified to produce voltage signals of varying strengths to correspond with the light and dark areas being picked up from the document. A white background produces a zero volt signal while black produces a 7-volt signal. Shades of gray and color produce voltage signals varying between 0 and 7.

The 0 to 7 volt signals are then converted into an FM signal which is applied to the acoustic telephone coupler, where it is in turn converted to an audible signal.

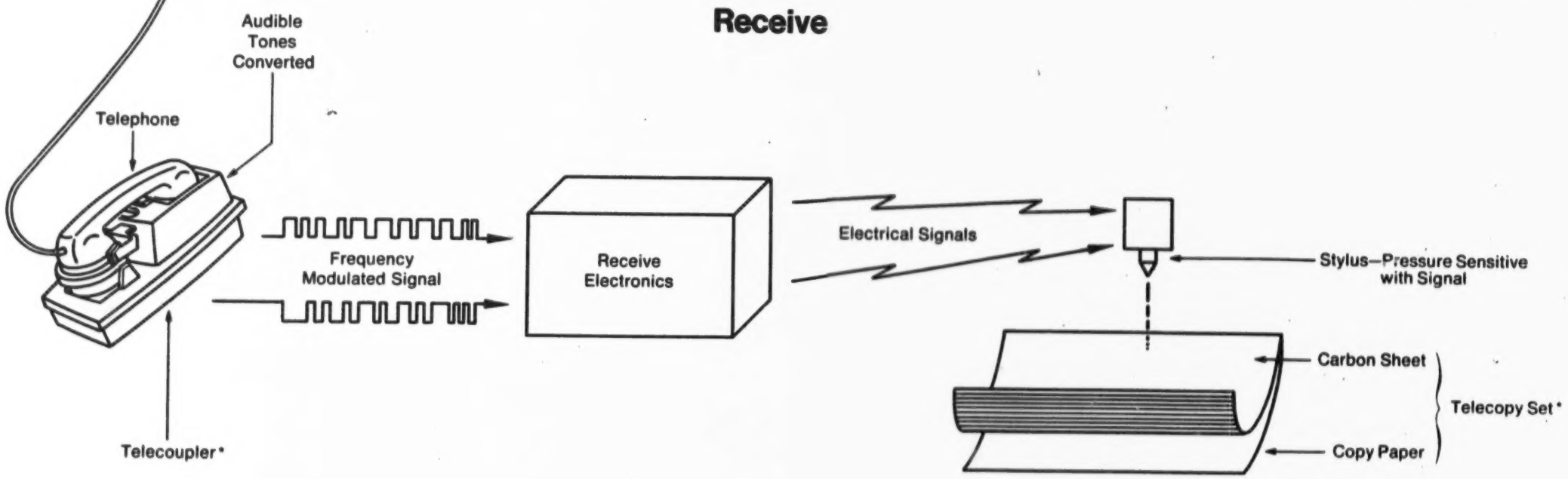
The audible signal is transmitted over the telephone line to the recipient's unit. There it is reconverted to an electronic signal and then into a varying DC voltage. This voltage actuates the stylus, causing it to press on the carbon set in the receiving unit.

Since twin styli rotate in synchronization with the twin scanners, wherever a scanner picks up a dark area, the stylus on

Send



Receive



The Xerox Magnafax Telecopier*

All components can be found in a single Telecopier, enabling each device to send and receive documents.

*Trademarks of Xerox Corporation

APPENDIX III (Continued)

the receiving end is actuated to extend and print out a corresponding dark area.

During the first 15 seconds of machine operation a phasing process puts the receiving stylus in the same position as the scanning device of the transmitting unit. A signal is sent to the receiver which causes a latch to engage in the proper place of a 322-tooth gear synchronization clutch, which enables scanner and printer to be in an identical position. The scan-print drive motors are kept synchronized by crystal-controlled oscillators.

INTERLIBRARY TELECOPY WORKSHEET Campus:_____ Request no._____

Main Entry_____
(Title of journal, author of book, or issuing agency of report or document)
Vol.___ No.____ Date_____ Pages_____ Series and No._____
Author of article or report:_____
Title of article, report, or book:_____

Call no: ☐ Completed

☐ Unable to send because:
- ☐ In use
- ☐ Missing
- ☐ Library lacks this item
- ☐ Unable to telecopy satisfactorily

Date	Time	Function Completed
_____	_____	Request received from patron
_____	_____	Request transmitted Verbally ☐ Telecopied
_____	_____	Item checked for availability
_____	_____	Item retrieved from shelves
_____	_____	Item copied (Xeroxed)

Date	Time	
_____	_____	Item transmitted
_____	_____	Item delivered to requester

Total elapsed time_____ Days_____ Hours_____ Minutes

Requester's Name:_____ Telephone:_____ Status:
- ☐ Faculty
- ☐ Graduate
- ☐ Other

☐ Deliver to: Campus:_____ Building:_____ Room:_____

☐ Hold for Pick-up

☐ Notify Requester

☐ Notify:_____ Telephone:_____

☐ Cancelled

☐ Refer to ILL

☐ Acceptable quality

☐ Borderline

☐ Unacceptable quality

Request received by:_____

Comments:

APPENDIX V, Table 1 COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH LOCAL OR NO-TOLL TELEPHONE SERVICE)

VOLUME OF USE: 100 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COST	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$1.00	$10.00
VARIABLE COSTS	Machine Time (Meter Charges)	0	0	0	0
	Operator * Time $2.40 per hour	16.00	192.00	.16	1.60
	Supplies	1.00	12.00	.01	.10
TOTALS		117.00	1404.00	1.17	11.70

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 2 COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH LOCAL OR NO-TOLL TELEPHONE SERVICE)

VOLUME OF USE: 500 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COST	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$ .20	$2.00
VARIABLE COSTS	Machine Time (Meter Charges)	220.00	2640.00	.24	2.40
	Operator * Time $2.40 per hour	80.00	960.00	.16	1.60
	Supplies	5.00	60.00	.01	.10
TOTALS		405.00	4860.00	.61	6.10

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 3 COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH LOCAL OR NO-TOLL TELEPHONE SERVICE)

VOLUME OF USE: 1000 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COST	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$ .10	$1.00
VARIABLE COSTS	Machine Time (Meter Charges)	270.00	3240.00	.27	2.70
	Operator * Time $2.40 per hour	160.00	1920.00	.16	1.60
	Supplies	10.00	120.00	.01	.10
TOTALS		540.00	6480.00	.54	5.40

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 4 COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH LOCAL OR NO-TOLL TELEPHONE SERVICE)

VOLUME OF USE: 1500 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COST	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$ .067	$ .67
VARIABLE COSTS	Machine Time (Meter Charges)	420.00	5040.00	.28	2.80
	Operator * Time $2.40 per hour	240.00	2880.00	.16	1.60
	Supplies	15.00	180.00	.01	.10
TOTALS		775.00	9300.00	.517	5.17

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 5 COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH 150-MILE LEASED LINE)

VOLUME OF USE: 100 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COSTS	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$1.00	$10.00
	Telephone Leased Line (150 Miles)	300.00	3600.00	3.00	30.00
VARIABLE COSTS	Machine Time (Meter Charges)	0	0	0	0
	Operator * Time $2.40 per hour	16.00	192.00	.16	1.60
	Supplies	1.00	12.00	.01	.10
TOTALS		417.00	5004.00	4.17	41.70

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 6

COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH 150-MILE LEASED LINE)

VOLUME OF USE: 500 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COSTS	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$ .20	$2.00
	Telephone Leased Line (150 Miles)	300.00	3600.00	.60	6.00
VARIABLE COSTS	Machine Time (Meter Charges)	220.00	2640.00	.24	2.40
	Operator * Time $2.40 per hour	80.00	960.00	.16	1.60
	Supplies	5.00	60.00	.01	.10
TOTALS		705.00	8460.00	1.21	12.10

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 7

COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH 150-MILE LEASED LINE)

VOLUME OF USE: 1000 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COSTS	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$ .10	$1.00
	Telephone Leased Line (150 Miles)	300.00	3600.00	.30	3.00
VARIABLE COSTS	Machine Time (Meter Charges)	270.00	3240.00	.27	2.70
	Operator * Time $2.40 per hour	160.00	1920.00	.16	1.60
	Supplies	10.00	120.00	.01	.10
TOTALS		840.00	10080.00	.84	8.40

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX V, Table 8

COST OF OPERATION

XEROX MAGNAFAX TELECOPIER (WITH 150-MILE LEASED LINE)

VOLUME OF USE: 1500 PAGES PER MONTH

CATEGORY	ITEM	COST PER MONTH	COST PER YEAR	COST PER PAGE	COST PER 10-PAGE TRANSACTION
FIXED COSTS	Minimum Monthly Charge (2 Machines)	$100.00	$1200.00	$ .067	$ .67
	Telephone Leased Line (150 Miles)	300.00	3600.00	.20	2.00
VARIABLE COSTS	Machine Time (Meter Charges)	420.00	5040.00	.28	2.80
	Operator * Time $2.40 per hour	240.00	2880.00	.16	1.60
	Supplies	15.00	180.00	.01	.10
TOTALS		1075.00	12900.00	.717	7.17

* Operator time only, including verbal communication time and excluding operator time available for other work while transceiving is in progress.

APPENDIX VI

Examples of Telecopied Materials

(The samples on the following pages were transceived from Xerox 914 copies of average quality)

Received from Davis on #35
4/27/66

Managers and Owners, Then and Now[1]

BY W. LLOYD WARNER AND J. O. LOW

THREE DEAD men played powerful, important, and, at times, decisive roles in the outcome of the strike. Paradoxically, although they were former owners and managers of the factories, their influence materially aided the strikers and helped defeat management. Throughout the struggle, the owners,[2] workers, and most of Yankee City continued to recognize the great wisdom of these dead owners and managers and always bowed to their judgments. The authority of these men accordingly was constantly quoted by each side to gain approval for what it said and did and to stigmatize the words and actions of its antagonists. The peacemakers quoted the deeds and sayings of the three as parables and precepts to force the warring parties to come to agreement. It is unlikely that the actual behavior of these three men corresponded to the symbols into which they had been fabricated by those who remembered them after their deaths. But it is certain that the values inherent in them as collective representations ordered and controlled much of the thinking of everyone and greatly contributed to the workers' winning the strike.

[1] Reprinted from *The Social System of the Modern Factory*, by W. Lloyd Warner and J. O. Low, Yale University Press, 1947. Used by permission of the publishers.

[2] Each person, each institution, and each incident is a composite drawing. No one actual individual or family in Yankee City is depicted, rather the lives of *several individuals* are compressed into that of one fictive person. . . . The justification for these changes lies in our attempt to protect our subjects and to tell our story economically. We have not hesitated to exclude all material which might identify specific persons in the community; and we have included generalized material wherever necessary to prevent recognition. The people and situations in some of the sketches are entirely imaginary. In all cases where changes were introduced in the reworking of our field notes, we first satisfied ourselves that they would not destroy the essential social reality of the points of the original interview. Only then were such materials included in our text.

THE MANAGERS OF MEN WERE GODS

The three—Caleb Choate, Godfrey Weatherby, and William Pierce—were constantly quoted; episodes from their exploits, as brilliant Yankee City industrialists and wise and generous employers of Yankee City men, were frequently spoken of and applied to present conditions in the shoe industry to the detriment of the contemporary managers and owners. Since the sagacity of the three verged on the supernatural, no flesh and blood owner living in Yankee City at the time of the strike could hope to measure up to the standards of these demigods. It is small wonder that managers felt weak and inadequate when they compared themselves with the great men of the past, and it is certain from their utterances and deeds that they shared feelings of guilt in the presence of their accusing employees. Their private knowledge of themselves and faith in the great managers of the past made them weak, for now that myth-making had done its work and mortals were translated into gods, the prosaic men of the present could never hope to compete with these heroes and demigods who plagued them from the past.

We will examine the evidence to see what these men were in real life but only briefly since it was what the men and women of the strike believed them to have been that made them important for this study. In the section which follows we will discuss the social personalities of the contemporary managers; then we will compare the evidence from the past and present to learn why the three dead owners were still powerful when their successors, with all the recognized glory of modern technology to support them, were considered weak and inadequate.

Caleb Choate was a pioneer in large-scale shoe manufacturing in Yankee City; both Godfrey Weatherby and William Pierce received their training under him.

Mr. Choate's success is indicated by the fact that from a capital of $100 (in 1866) he had built up a business with annual gross sales of a million dollars. By 1877, at the age of thirty, he was the "head of a large and successful manufacturing business and was one of the solid

Annual epidemiological and vital statistics

614.1
W893s

World Health Organization.

Statistiques épidémiologiques et démographiques annuelles. Annual epidemiological and vital statistics. 1939–46—
Genève.

v. 23 cm.

Supersedes Rapport épidémiologique annuel, Annual epidemiological report issued by the League of Nations, Secretariat, Health Section.

1. Epidemics—Stat. 2. Vital statistics. 3. Medical statistics. I. Title. II. Title: Annual epidemiological and vital statistics.

RA651.A485 614.1

Library of Congress (8905)

GOVT.
PUB.
DEPT.

Epidemics- Statistics.

614.1
W893s

World Health Organization.

Statistiques épidémiologiques et démographiques annuelles. Annual epidemiological and vital statistics. 1939–46—
Genève.

v. 23 cm.

Supersedes Rapport épidémiologique annuel, Annual epidemiological report issued by the League of Nations, Secretariat, Health Section.

1. Epidemics—Stat. 2. Vital statistics. 3. Medical statistics. I. Title. II. Title: Annual epidemiological and vital statistics.

RA651.A485 614.1

Library of Congress (8905)

GOVT.
PUB.
DEPT.

Medical statistics.

614.1
W893s

World Health Organization.

Statistiques épidémiologiques et démographiques annuelles. Annual epidemiological and vital statistics. 1939–46—
Genève.

v. 23 cm.

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GOVT.
PUB.
DEPT.

Vital statistics.

614.1
W893s

World Health Organization.

Statistiques épidémiologiques et démographiques annuelles. Annual epidemiological and vital statistics. 1939–46—
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v. 23 cm.

Supersedes Rapport épidémiologique annuel, Annual epidemiological report issued by the League of Nations, Secretariat, Health Section.

1. Epidemics—Stat. 2. Vital statistics. 3. Medical statistics. I. Title. II. Title: Annual epidemiological and vital statistics.

GOVT.
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#28 to #27

ONE-LINE EXAMPLES OF INTERTYPE FACES

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6 to 14 point will run regular in all magazines, also 18 and 24 point lower case in any section of magazine; 18 point caps in lower case section of 90 channel magazine; 24 point caps in lower case section of 72 channel magazine.

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14. ELIGIBILITY TO VOTE AS A FACULTY MEMBER ON CLASS A ACTIONS

15. ELIGIBILITY TO VOTE IN ELECTIONS FOR UNIVERSITY COUNCIL MEMBERS

16. ELIGIBILITY FOR MEMBERSHIP IN THE UNIVERSITY COUNCIL

17. ELIGIBILITY TO BE COUNTED TOWARD DETERMINING THE NUMBER OF REPRESENTATIVES ON THE UNIVERSITY COUNCIL

18. ELIGIBILITY TO VOTE IN DEPARTMENTAL MATTERS

As indicated on the Chart, decisions as to who shall have this privilege should be determined by the majority of the full-time members of each academic department.

19. ELIGIBILITY TO PARTICIPATE IN DECISIONS ON HIRING FACULTY, PROMOTIONS, AND AWARDING OF TENURE

Qualified faculty members should participate in these decisions as indicated in the following recommendation:

RECOMMENDATION #4: a) That department chairmen will consult with appropriate members of the department in preparing all recommendations on initial appointments, promotions, and tenure, consulting staff members whose rank is above that of the candidate, or on tenure decisions with staff members holding tenure.

b) That if a chairman does not accept the recommendations of these groups or does not accept the result of any majority vote of the department as a whole, he shall inform them the reasons for his action.

c) In the case of a department which is too small for the procedure described above to be practicable, the Dean will make recommendations in these matters after consulting appropriate members of the faculty.

20. FACULTY LIBRARY PRIVILEGES

These include the privilege of borrowing books from the University Library for extended loan periods, the use of the Interlibrary Loan service, exemption from overdue fines for periodicals, and several other considerations.

21. PRIVATE OFFICE

The Committee feels that full-time academic faculty are definitely entitled to private offices, and should be provided with them.

END 12.22.69